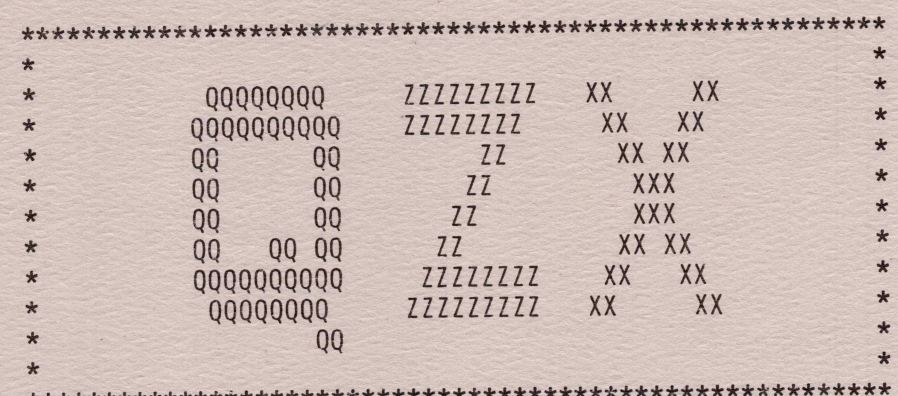
QQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQ ZZZZZZZZ XX XX
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QQ

The Journal Covering Amateur Radio & Sinclair Computers
ZX-80; Micro-Ace; ZX81; T/S 1000, 1500, & 2068; QL
2025 O'Donnell Drive
Las Cruces, New Mexico
88001

K5XY
Alex. F. Burr
Publisher

W4GHV
Bo Barry
Editor

Volume 4 Number 12 ($1.50-issue) November 1986

* QZX Net Report
* BCS Sinclair Comments
* Confessions of a Sinclair Junkie (contd), WA6DLI
* Electricity Test, (A 2068 program), M. Coombes, modified by WA6DLI
* QZX Friends
* Bits & Bytes
* Unclassified Ads

Seasons Greetings from the QZX Gang!

QZX NET REPORT

We do not get many reports on Sinclair nets, but WA6DLI just sent us one of an active west coast net. He says that the QZX Pacific Coast Net is active on 7.235 MHz at 10 AM local time on Saturdays. Check in to find out the latest Sinclair news.

BCS Sinclair Comments

The Boston Computer Society has a Sinclair/Timex group which publishes a newsletter occasionally. Some of their observations are of interest to hams looking for Sinclair hardware information.

They are a bit overly pessimistic but do say that the only hardware advance of the year has been the increasing availability of third party disk drive interfaces, none of which are a clear favorite and most of which require a bit of hacking to use efficiently. The price of these somewhat custom made devices (which generally use IBM standard drives) has limited their acquisition to dedicated hardware collectors. Most have a rather incomplete DOS.

Fast tape drives (like Sinclair microdrives) are available and work as well as can be expected. Serial storage and retrieval is still time-consuming, but forms a reasonably priced alternative for those determined to use Sinclair equipment for serious projects.

Telecommunications for any Sinclair machine remains far behind the capabilities available on more popular equipment. Acceptable modems are available, but most software is far from user friendly. A shortage of bulletin boards combined with difficult file up and downloading, limit this means of software distribution.

QZX FRIENDS

KA9WAD -- Ken is the proud holder of a new novice call and is hard at work on his general.

K6USW -- We received pictures of Darwin's station which really makes good use of the Sinclair computers. You can see about three ZX81's, one with NU4V CW and RTTY boards, add on keyboards, monitors and a printer. He is active in the Pacific Coast net.

W*OGOL -- John gives us one of the reasons that so many people still use their older Sinclair computers. He says, "I was a subscriber but lost interest in the ZX-81. Recently I purchased an IBM compatible computer and found that experimenting with i was not as much fun as experimenting with my ZX-81. Since then I have purchased another ZX-81 and some other accessories in hopes of learning about more of the features of the ZX-81."

BITS AND BYTES

89. The QL can be made to copy cw slowly with a simple SuperBasic program. Input can be obtained by supplying TTL levels via one of the network input jacks. Then the QL's network port can be used. This port is named PC.IPCRD and is located at read only address 65568 (18020 hex). This port's BIT 0 may be read for input only.

90. Good color picture can be taken from the monitor or TV screen with the new Polaroid spectra. Use it on AUTOEXP and turn the flash off.

91. If you have a MD-2 Byte-Back modem and want to convert it for use with the T/S 2068 there is available from Byte-Back a kit which is fairly simple to install.

92. If you want to convert a Byte-Back modem to run at 1200 baud try doing the following steps.

cut the trace leading to pin 8 of U6
connect this trace to pin 11 of U6 (increases speed by x8 to 2400 BPS)
cut the trace leading to pin 4 of U6
connect this trace to pin 5 of U6 (cuts speed in half to 1200 baud).

If you want to use the interface with a modem (rather than a printer) you will have to connect the RXD (receive line). Do this by putting a jumper from pin 3 of U8 to pins 9 and 10 of U12.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

CONFESSIONS ... by WA6DLI (continued from October)

Just to compete the picture the other business programs that really show up the clones are: Tom Woods Profile 2068 (I'm on the cover of his manual for showing him that real world people use his stuff in an important function). This is a speedy data base that is so free form it can be my disk directory, ham log, file of all telephone central offices in California. (No I don't work for the telephone company..I am an engineer in the State PUC that regulates them). My graphics analysis program is Figaro II from Curry Computer, PO Box 5607, Glendale, AZ 85312-5607. My Omnicalc II is from A. Arthur Brown or other Sinclair software dealers. I just got a nifty compiler from Novelsoft in Toronto, Canada that advertises in Time Designs. These are new programs, written in late 1986 for the TS2068 and Spectrum (each version on one side of the cassette). Novelsoft also has Artworx and a Calendar program ITS ABOUT TIME which has a world time map.

Since my disk drives are the same as the Mac or AT, about the only improvement would be a "professional" keyboard. I just received from England an almost prototype first production SAGA keyboard with all the double function SPECTRUM keys on separate keys and the whole thing is not wired to the computer at all so you can hide it somewhere where you can just reach the disk drives. An infrared receiver hooks to the edge connector and takes in the keyboard commands from anywhere in the room. Sad to say I have a minor glitch to clear up as the keyboard sends (as heard on my IR Sennheiser Hi-Fi headphones) but IR receiver is not talking to the computer yet! Suspect causes are too many pull-up resistors in my particular set-up. My Z-Link may be overloaded on its 9V output which measures 8.5 volts. I will try a separate power supply.

I ran into an English family trying to buy something to make their Spectrum work in an electronics store on Saturday. Were they lucky I was there as no one knew what they were talking about. Sunday I invited them to my house and hooked up their Spectrum to a Timex 1000 power supply 9 volts after changing the computer plug end, tuned in the signal out on about channel 33 (only UHF in English TV) and readjusted the vert sync on the TV to stop rolling (50 cycle sycn on Spectrum and 60 cycle on American TV...and Voila a beautiful black and white picture. The 12 year old had not been able to play his game tape (IMAGINE BASKETBALL) for six months so was he thrilled. Then I tried my keyboard on the real Spectrum but it didn't work so now I have to see if my home brew power supply is at fault. The 12 year old English kid knew more about Spectrum loading patterns than anyone I have seen except Dar K6USW that recently reported into QZX news. He said "See that fuzz there? That is the new copy protection Imagine uses to prevent tape duplication!" Maybe I hetter keep in touch with him I might learn something.

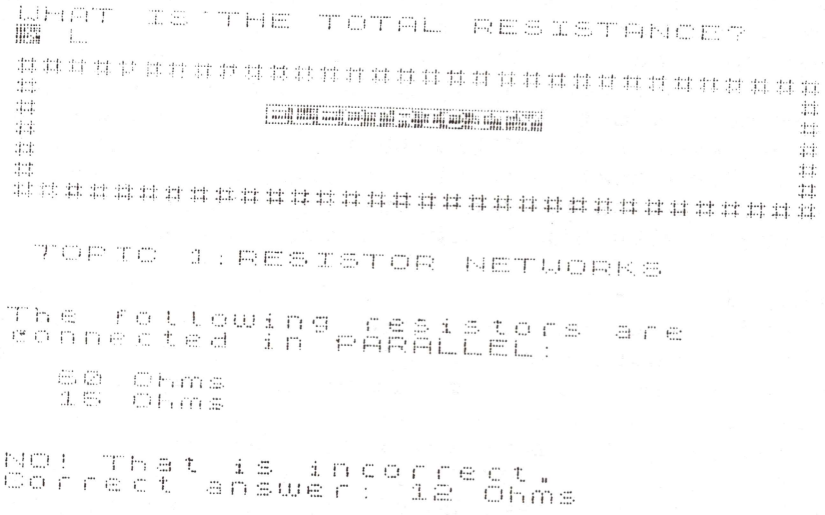
I have found the Sinclair users to include some high powered computer types and executives that just love them for their unique qualities and charm even though they have Ataris, Macs, IBMs etc. also for commercial programming reasons. The only upgrade I see for a 2068 is perhaps the Amiga, but before I try that bubble I will get the American QL to learn about the 68000 chip family. The Mac, Atari 520/1040, and Amiga use the Motorola 68000 CPU. The Sinclair QL uses the 68008 which has the same instruction set but 8 address lines instead of 16. Phooey you say, well that's what the IBM PC and XTs and clones have too. This means you can have the accessory chip set to run the 68008 out of the 8 address-line stable where they are made by the thousands and are cheap.

Just for perspective remember that as chip CPUs go a Timex, Osborne, Atari 800, Commodore 128, Spectrum are 8/8 machines (address lines/chip internal), the IBM PC and XT are 8/16 machines, the IBM AT is 16/16, the QL is 8/32 and the Mac, Amiga, and Atari 520/1040 are 16/32 machines. The Atari screwed up somewhere inside as it can only access 4 megabytes to the Amiga's 16. Something to do with combined access line limit..eg QL 2^20, Atari 2^22, and Amiga 2^24. Now this is direct access, after all the TS2068 can access 255 x 64k or 16 megabytes but only 64k at a time if we figure out how to get past the first 3 banks. Timex did not finish the hardware/software but the newsletters are working it out.

A friend just bought a real IBM with deluxe printer, hard disk, RGB Monitor etc. It took three weeks of negotiation and the threat of a lawsuit to get the store to check why his printer wouldn't function..he had been on the phone to everyone for suggestions. He got the store to confess that their tech had connected his parallel port cable to the wrong plug on the interface board! So spending three grand doesn't get you half the respect all the Timex-Sinclair mail order dealers give you. I have had long distance phone calls just to tell me the order would be shipped a day or so late. I expect my friend will figure out how to use his word processor about next March! He may have to go to school to do it...that what the pundits where he got it tell him. I am afraid to let him see how Spectrum programs look on my RGB monitor! He sees my amber one at work.

I will report back on the IF Keyboard and when I master Beta Basic which is what gives the Spectrum/2068 the SuperBasic of the QL with single keystroke facility retained! That QL I ordered may be a museum piece, but I see OM4IHJ says he has a QL satellite program hummmmm?

73 til next time!



ELECTRICITY TUTORIAL

```
  10 REM physics by M. Coombes   11/83
  11 REM WA6DLI translation from Practical Computing 10/84      England
  12 REM *initialization*
  14 LET ru=0
  16 DIM s(5): DIM b$(32)
  20 REM *set up displays*
  30 BRIGHT 0: BORDER 5: PAPER 5: INK 1: CLS
  40 FOR f=2 TO 4: PRINT AT f,10; INVERSE 1;"ELECTRICITY"
  50 LET a$="£££££££££££££££££££££££££££££££": PRINT AT 0,0;a$;AT 6,0;a$: FOR f
=1 TO 6: PRINT AT f,0;"£";AT f,31;"£": NEXT f
  60 IF ru=1 THEN GO TO 120
  70 REM *introduction*
  80 PRINT '"This program is designed to testyou on some of the calculations inv
olved with basic electrical  physics."
  90 PRINT '"You will first be asked twenty  questions on various topics,and at
the end of the test,a report will be printed out to show     which topics will n
eed further  review."
 100 PRINT '' INK 2;"PRESS ANY KEY TO START THE TEST"
 110 IF INKEY$="" THEN GO TO 110
 115 FOR f=8 TO 21: PRINT AT f,0;b$: NEXT f
 120 FOR f=8 TO 10: PRINT AT f,0; PAPER 2; BRIGHT 1;b$: NEXT f
1000 REM *topic £1*
1005 LET u$="Ohms"
1010 LET to=1: LET t$="RESISTOR NETWORKS": GO SUB 8500
1020 FOR Q=1 TO 2: GO SUB 7000
1040 PRINT AT 12,0; INK 0;"The following resistors are"'"connected in SERIES:"''
1050 LET ANS=0: FOR F=1 TO (RND*2)+2: LET r=INT ((RND*5)+1)*10: LET ans=ans+r: P
RINT TAB 2;r;" ";u$: NEXT f
1060 INPUT "WHAT IS THE TOTAL RESISTANCE?"'"> ";t
1070 GO SUB 8000
1080 PAUSE q
1090 FOR q=1 TO 2: GO SUB 7000
1100 RESTORE 1900
1110 FOR f=1 TO INT (RND*6)+1: READ r1,r2,ans: NEXT f
1120 PRINT AT 12,0; INK 0;"The following resistors are"'"connected in PARALLEL:"
''TAB 2;r1;" ";u$'TAB 2;r2;" ";u$
1130 INPUT "WHAT IS THE TOTAL RESISTANCE?"'"> ";t
1140 GO SUB 8000
1150 NEXT q
1900 DATA 20,5,4,12,3,2.4,100,25,20,40,10,8,60,15,12,140,35,28
2000 REM *topic £2*
2005 LET u$="cents"
2010 LET to=2: LET t$="COSTING OF ELECTRICITY": GO SUB 8500
2020 FOR q=1 TO 4
2030 GO SUB 7000
2040 LET wa=INT ((RND*10)+1)*100: LET p=INT (RND*4)+2: LET h=INT (RND*5)+2
2050 PRINT AT 12,0; INK 0;"What is the cost of running a"'wa;" watt appliance fo
r ";h;" hours"'"at ";p;" cents per kwh?"
2060 LET ans=(wa/1000)*h*p
2070 INPUT "> ";t: GO SUB 8000
2080 NEXT q
3000 REM *topic £3*
3010 LET to=3: LET u$="volts": LET t$="OHMS LAW": GO SUB 8500
3020 FOR q=1 TO 2
3030 GO SUB 7000
3040 LET r=INT ((RND*9)+1)*50: LET i=INT (RND*5)+1
3050 IF r=8 THEN GO TO 3040
3060 PRINT AT 12,0; INK 0;"What is the voltage across a"'r;" ohm resistor when a
```

```
3070>LET ans=r*i: GO SUB 8000
3080 NEXT q
3090 LET u$="Ohms"
3110 GO SUB 7000
3120 LET i=INT (RND*5)+1: LET v=INT ((RND*30)*10)+10
3130 IF v/i<>INT (v/i) THEN GO TO 3120
3140 PRINT AT 12,0; INK 0;"What value of resistor gives a"'"current of ";i;" amp
s when there"'"are ";v;" volts across it?"
3150 INPUT "> ";t
3160 LET ans=v/i: GO SUB 8000
3180 LET u$="amps"
3195 GO SUB 7000
3200 LET v=INT ((RND*40)*10)+10: LET r=INT (RND*40)+1
3210 IF v/r<>INT (v/r) THEN GO TO 3200
3220 PRINT AT 12,0; INK 0;"What current flows through a"'r;" ohm resistor with "
;v;" volts"'"across it?"
3230 INPUT "> ";t
3240 LET ans=v/r: GO SUB 8000
4000 REM *topic £4*
4010 LET to=4: LET u$='watts": LET t$="POWER": GO SUB 8500
4020 FOR q=1 TO 2
4030 GO SUB 7000
4040 LET i=INT (RND*5)+1: LET v=INT (RND*20)+2
4050 PRINT AT 12,0; INK 0;"What is the power of a light"'"bulb if ";i;" amps flo
w through"'"it when there are ";v;" volts"'"across it?"
4060 INPUT "> ";t
4070 LET ans=v*i: GO SUB 8000
4080 NEXT q
4090 LET u$="amps"
4100 FOR q=1 TO 2
4110 GO SUB 7000
4120 LET p=INT ((RND*10)*10)+50: IF p/12<>INT (p/12) THEN GO TO 4120
4130 PRINT AT 12,0; INK 0;"What current flows through a"'p;" watt appliance conn
ected to"'"a 12 volt supply?"
4135 INPUT "> ";t
4140 LET ans=p/12: GO SUB 8000
4150 NEXT q
5000 REM *topic £5*
5010 LET to=5: LET u$="turns": LET t$="TRANSFORMERS": GO SUB 8500
5020 FOR q=1 TO 2
5030 GO SUB 7000
5040 LET iv=INT ((RND*10)*10)+20: LET ov=INT ((RND*10)*2)+20: IF iv/ov<>INT (iv/
ov) THEN GO TO 5040
5050 LET ts=INT ((RND*10)*10)+10
5060 PRINT AT 12,0; INK 0;"If a transformer has an input of"'iv;" volts,an outpu
t of "'ov;" volts and a secondary coil"'"of ";ts;" turns,how many turns are"'"th
ere on the primary coil?"
5080 INPUT "> ";t
5090 LET ans=(iv*ts)/ov: GO SUB 8000
5100 NEXT q
5110 LET u$="volts"
5115 FOR q=1 TO 2
5117 GO SUB 7000
5120 LET tp=INT ((RND*8)*50)+100: LET ts=INT ((RND*20)*2)+30: IF tp/ts<>INT (tp/
ts) THEN GO TO 5120
5130 LET ov=INT ((RND*10)*5)+10
5140 PRINT AT 12,0; INK 0;"If a transformer has an output"'"of ";ov;" volts and
has ";tp;" turns"'"on its primary coil and ";ts;" turns"'"on its secondary coil,
what is"'"the input voltage?"
```

```
5150>INPUT "> ";t
5160 LET ans=(tp*ov)/ts: GO SUB 8000
5170 NEXT q
5180 GO TO 9000
7000 REM *clear sectiondisplays*
7010 FOR f=11 TO 21: PRINT AT f,0;b$: NEXT f
7020 RETURN
8000 REM *check answers*
8005 BEEP .1,10
8010 IF t=ans THEN PRINT AT 20,0; INK 1;"WELL DONE!": FOR F=1 TO 10: BEEP .01,F:
 BEEP .01,F*2: BEEP .01,F*4: NEXT F: PRINT "That is correct": LET s(to)=s(to)+1:
 GO TO 8200
8020 IF INT t=INT ans THEN PRINT AT 19,0; INK 2;"Close enough!": FOR f=1 TO 5: B
EEP .02,20: NEXT f: PRINT "The exact answer is:"'ans;" ";u$: LET s(to)=s(to)+1:
GO TO 8200
8030 PRINT AT 19,0; INK 2;"NO!": FOR f=10 TO 0 STEP -1: BEEP .1,f: BEEP .1,f-2:
NEXT f: PRINT AT 19,4; INK 1;"That is incorrect."
8040 FOR f=1 TO 50: NEXT f: PRINT "Correct answer: ";ans;" ";u$
8200 FOR f=1 TO 200: NEXT f
8210 IF t<>ans THEN FOR f=1 TO 200: NEXT f
8220 RETURN
8500 REM *print topic £ titler*
8510 GO SUB 7000: PRINT AT 9,1; PAPER 2; BRIGHT 1;b$;AT 9,1; INK 7;"TOPIC ";to;"
:"; INK 7; FLASH 1;t$
8520 FOR f=1 TO 20: BEEP .01,20: BEEP .01,30: NEXT f
8530 PRINT AT 9,9; PAPER 2; BRIGHT 1; INK 7;t$
8540 RETURN
9000 REM *printout results*
9010 PAPER 7: BORDER 7: CLS
9020 PRINT TAB 10; INK 2; PAPER 6; FLASH 1;"TEST REPORT"
9030 FOR F=1 TO 20: BEEP .05,20: BEEP .05,30: NEXT F
9040 PRINT '"TOPIC 1"' INK 2;"Resistor Networks"
9050 PRINT '"TOPIC 2"' INK 2;"Cost of Electricity"
9060 PRINT '"TOPIC 3"' INK 2;"Ohm's Law"
9070 PRINT '"TOPIC 4"' INK 2;"Power"
9080 PRINT '"TOPIC 5"' INK 2;"Transformers"
9090 FOR f=1 TO 5: PRINT AT (f*3)+1,28;s(f);"/4": NEXT f
9095 LET tot=0: FOR f=1 TO 5: LET tot=tot+s(f): NEXT f
9100 PRINT INK 0'"OVERALL SCORE: "; INK 2;tot;"/20  =  ";(tot/20)*100;"%"
9110 BEEP 5,20
9120 PRINT AT 20,0;"WOULD YOU LIKE A HARD-COPY OF   THE RESULTS? (Press y OR n)"
9130 LET i$=INKEY$: IF i$="y" OR i$="Y" THEN GO TO 9150
9135 IF i$="n" OR i$="N" THEN GO TO 9165
9140 GO TO 9130
9150 PRINT AT 20,0;b$;b$
9160 IF i$="y" OR i$="Y" THEN COPY
9165 BEEP .3,20
9170 PRINT AT 20,0;"WOULD YOU LIKE ANOTHER TEST?"'"(Press Y OR N)"
9180 IF INKEY$="y" OR INKEY$="Y" THEN LET ru=1: GO TO 16
9190 IF INKEY$="n" OR INKEY$="N" THEN CLS : PRINT AT 15,10;"73"
9200 GO TO 9180
```

Due to printer setup the £ is really hash mark (SS3)
Also the > in INPUT should be Inverse Video (Shift 4)

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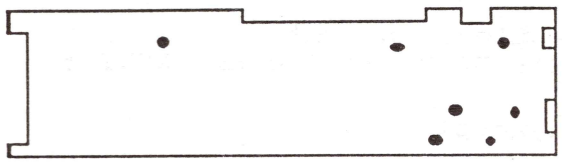
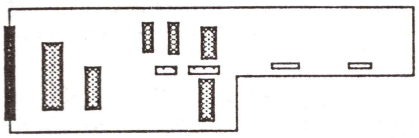
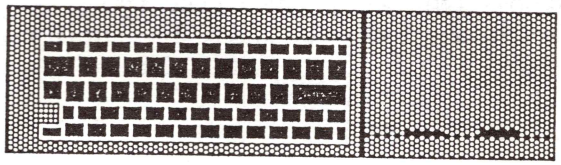
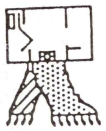
Parts List

QL CIRCUIT BOARD
TWO MICRODRIVES
ONE HEAT-SINK
UPPER CASE with KEYBOARD
LOWER CASE
SCREWS WASHERS
QL Circuit Diagram
Manuals cables power pack
2 Microdrive Cartridges





A+ Computer Response 69-b Island St. Keene, NH 03431

Sinclair QL Technical Profile

System Configuration

Basic system for $299 (U.S. price only) includes two processors, two custom-designed control chips, 128K main memory (expandable), operating system, programming language, full-size 65-key QWERTY keyboard, twin QL Microdrives (100K-byte capacity each with 3.5 seconds average access time), four software programs on Microdrive cassette (word processing, spreadsheet, database management, graphics), four blank Microdrive cassettes, power supply, connecting cables and adapters for TV, monitor and LAN.

Hardware

RAM: 128K, expandable externally to 640K (32K dedicated for screen bit map).

ROM: 48K, contains Sinclair SuperBASIC and Sinclair Qdos operating system (expandable via ROM cartridge to 64K).

CPU: MOTOROLA 68008, running at 7.5MHz, for all principal functions. (Architecturally the 68008 is a 32-bit processor with an 8-bit data bus. One megabyte of non-segmented address space is available.)

INTEL 8049, a second processor, controls keyboard, sound, RS-232C receive and real-time clock functions.

Custom Chips: Four Sinclair-designed ICs. The first controls display and memory; the second controls the Microdrives, the real-time clock, local area network and RS-232C transmission; the third and fourth provide analog functions required by the Microdrives.

Video: High-resolution graphics capability with color/monochrome monitor (or TV) in two modes; 512 x 256 pixels (4-color), 256 x 256 pixels (8-color).

Normal character display format up to 85 x 25 with choice of character sets available; TV format up to 60 columns depending on software.

Power Supply: 120 volts at 60Hz, 9v DC at 1.8 amps, 15.6v AC at 0.2 amps from transformer unit (19 watts to computer).

Mechanical Specifications

Dimensions:	5⅜"	x	1¾"	x	18¾"
	138mm	x	46mm	x	472mm
Weight:	3.055 lbs. (1388 gms.)				

Software

Operating System: Qdos, developed by Sinclair. Key features include:
- single-user multiple tasking
- time sliced priority job scheduler
- display handling for multiple screen windows
- device-independent input-output

Language: Sinclair SuperBASIC. Key features include:
- procedure structuring
- extendability (including syntax)
- interpretation speed independent of program size
- clean machine code interface
- operating system facilities accessible from SuperBASIC
- equal capability for strings and arrays

Communications

Serial: Two standard RS-232C communications interfaces for printers, modems, etc. Transmission at rates from 75-19,200 baud or full-duplex transmit/receive at seven rates up to 9600 baud. (Note: a parallel printer interface is under development as an optional extra).

LAN: For up to 64 Sinclair QL computers; data transmission over the net at 100K baud

Expansion

Excluding RGB monitor and power sockets and the TV port, nine peripheral/expansion ports are provided; internal expansion (1 port), Microdrive expansion (1), ROM cartridge (1), serial (2), local area network (LAN) (2), joysticks (2). For serial and LAN, see Communications.

Memory: One megabyte of non-segmented address space is available for almost unlimited potential for expansion.

Microdrive: Enables a further six QL Microdrives to be attached. Four blank cartridges are supplied with each QL.

ROM Cartridge: Accepts one QL ROM cartridge up to 16K.

Joysticks: Provision for one or two for games or cursor control.

Sinclair Packet Notes

K5XY

Most recent packet effort was put into the QL.I have been trying to get rid of the Modaptor, which is a commercial smart cable placed between the QL and the TNC. It works fine on 300 baud. It will also work on 1200 baud if you remember to place the receive data rate switch in the right position. Unfortunately in that configuation the last eight characters you have typed do not display on the QL screen. This situation makes it difficult to correct typing errors. It is not a serious problem because the 300 baud connection between the computer and the TNC does not disturb the 1200 baud TNC data rate and only slows down long file transmissions.

The modaptor is useful because it provides a ready made cable with the correct connections and the QL instructions are not clear enough to unambiguously make up your own cable. My first attempt did not work. I could only receive the sign-on message from the TNC if I held one of the keys of the QL down,and this only at 1200 baud.

I also discovered that on the T/S 1500 (T/S 1000 and ZX81) with the Conlink I adaptor that if you press SHIFT ENTER the effect is the same as if you pressed SHIFT 7 Y (control Y). The effect of CONTROL Y is to cancel screen output so the screen remains a blank. I discoved this difficulty when I accidently pressed SHIFT ENTER while trying to delete an error. The only thing I could make happen after pressing that combination was to make the cursor scroll down the screen when I pressed ENTER. I thought RAM wobble had gotten me or something had become unglued. The cure is to press SHIFT 7 Y (CONTROL Y) again. This action will restore screen output and everything will be back to normal again.

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P.O. Box 64, Jefferson, NH 03583

QL KIT

An inexpensive way to get a 68000 type machine. See article in October QZX and ad in this issue. To get your kit send a check for $130 immediately to QZX, 2025 O'Donnell, Las Cruces, NM 88001. Your kit will be sent to you shipping prepaid in continental USA.

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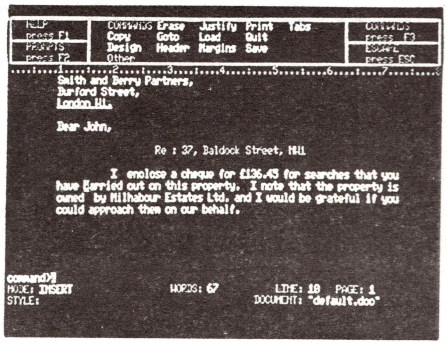
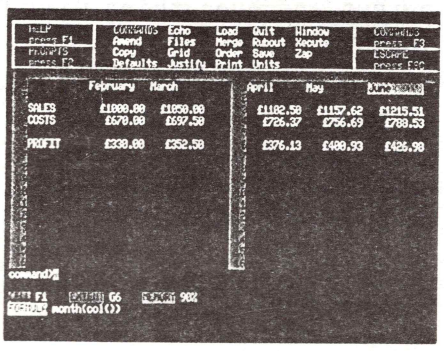

Smith and Berry Partners,
Burford Street,
London.
Dear John,
Re : 37, Baldock Street, Hill
I enclose a cheque for £126.43 for searches that you have carried out on this property. I note that the property is owned by Hillsbour Estates Ltd. and I would be grateful if you could approach them on our behalf.
command>
MODE: INSERT
STYLE:
WORDS: 67
LINE: 18 PAGE: 1
DOCUMENT: "default.doc"

Spreadsheet

The QL Spreadsheet program is another useful program included with your Sinclair QL. The spreadsheet is one of the most popular, but traditionally one of the hardest to understand and use. QL Spreadsheet makes simultaneous calculations and "what if" model-construction easier. Sample applications are provided, including budget planning and cash-flow analysis. Unlike many other spreadsheets, QL Spreadsheet allows you to refer to rows, columns and cells by the names you assign to them, not meaningless letters and numbers. You can also assign function keys to change a variable and carry out a complete "what if" calculation with one key stroke.



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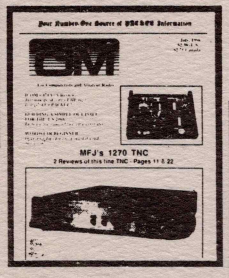

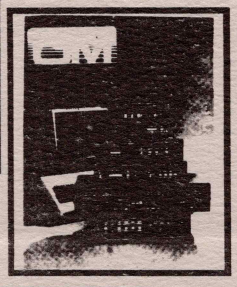

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